Nov. 10, 1959 C. SMITH 2,911,818

INTERLOCKING BUILDING BLOCKS

Filed Nov. 10, 1955 3 Sheets-Sheet 1

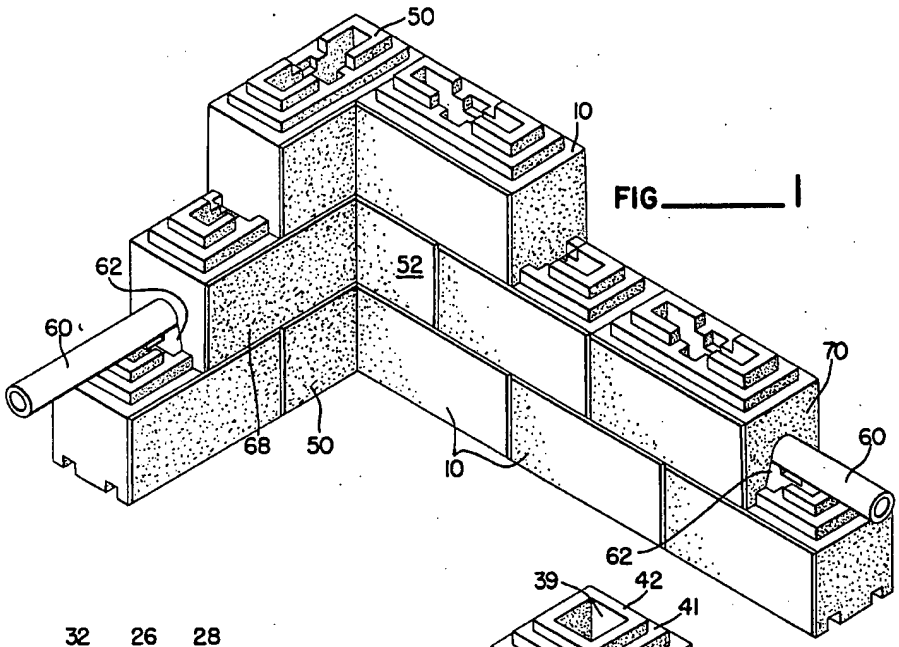

FIG. 1

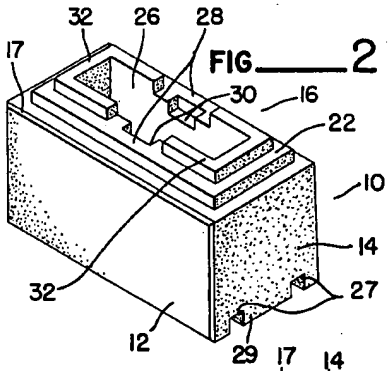

FIG. 2

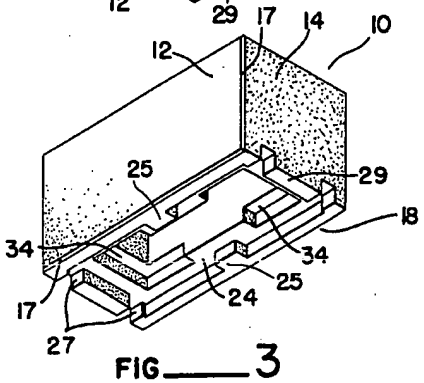

FIG. 3

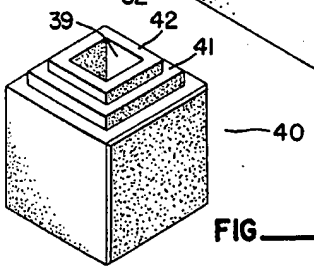

FIG. 4

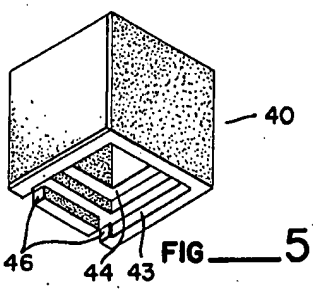

FIG. 5

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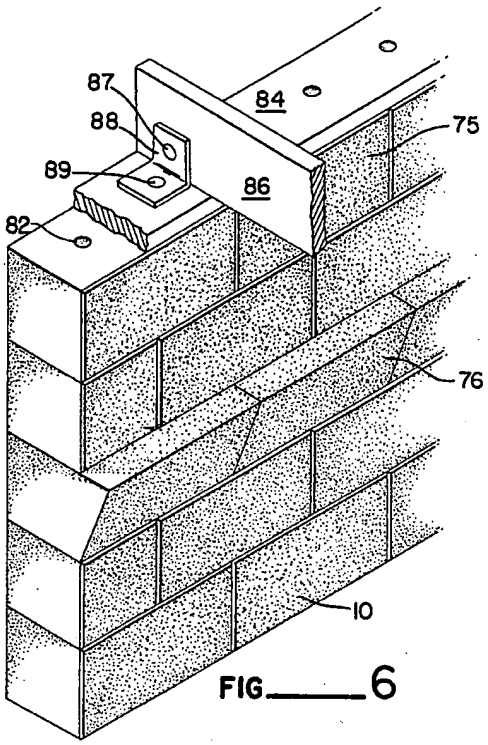

FIG. 6

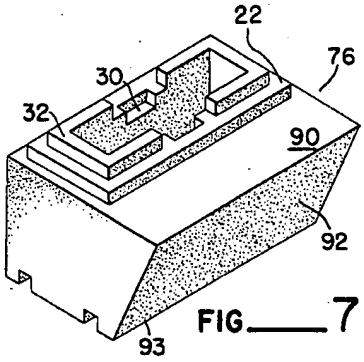

FIG. 7

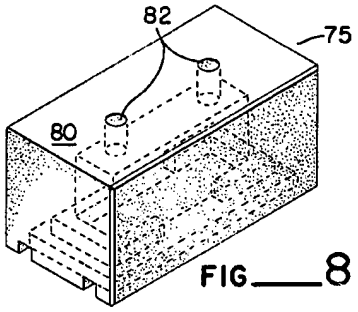

FIG. 8

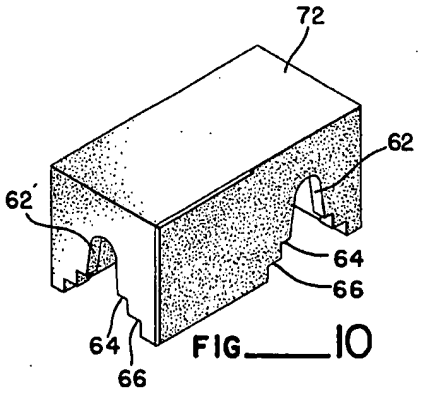

FIG. 10

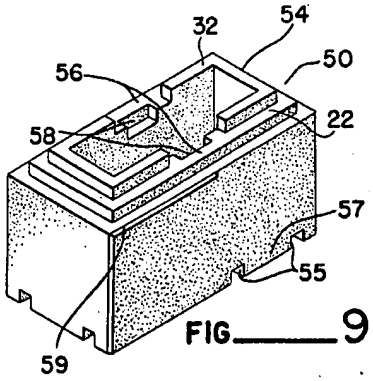

FIG. 9

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INTERLOCKING BUILDING BLOCKS

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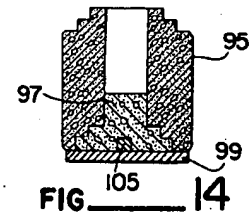

FIG. 14

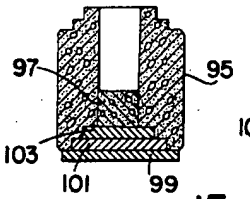

FIG. 15

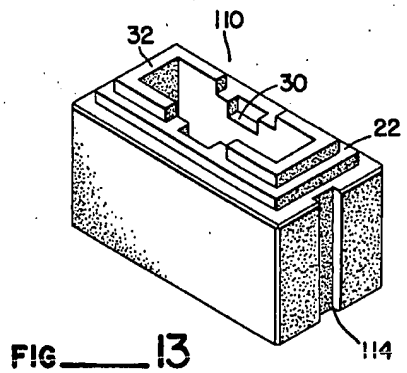

FIG. 13

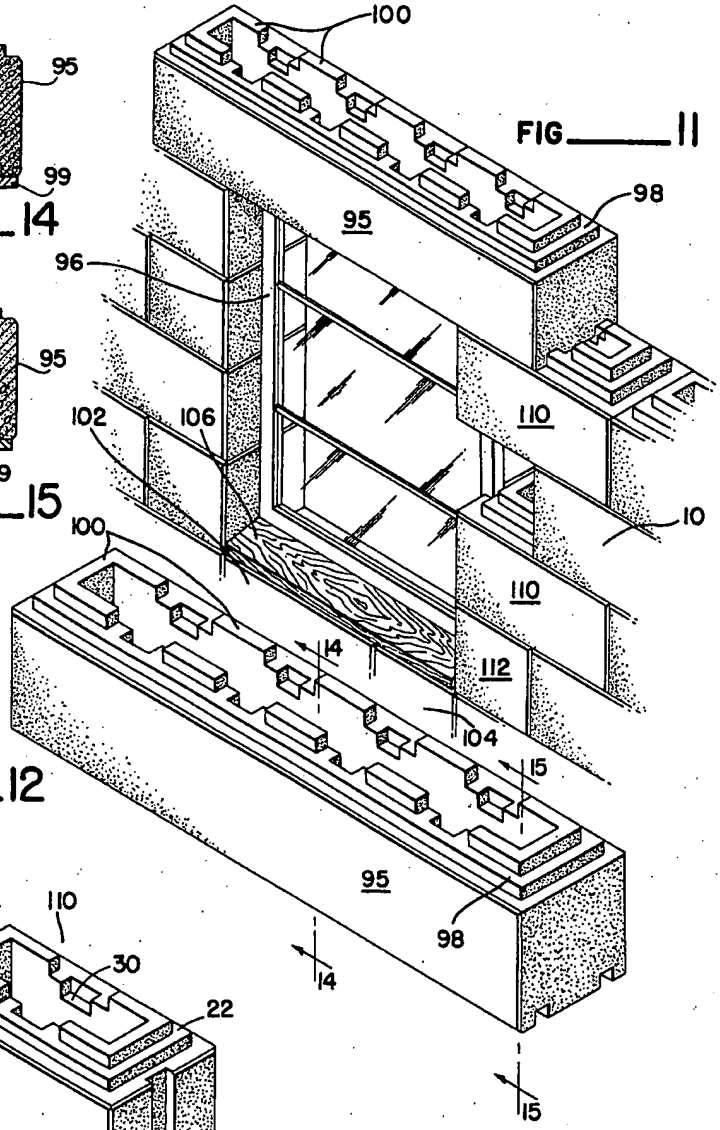

FIG. 11

FIG. 12

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Patented Nov. 10, 1959

2,911,818

INTERLOCKING BUILDING BLOCKS

Charles Smith, Seattle, Wash.

Application November 10, 1955, Serial No. 546,096

1 Claim. (Cl. 72—41)

My present invention relates to building blocks of the type usually formed of cementitious materials and which are precast or molded and delivered to the building site ready for assembly into structural walls. The distinguishing characteristics of my present building blocks consist in providing a plurality of blocks, the majority of which are of a uniform design, arranged to interlock so that the blocks will be held in alignment and against displacement from that alignment. Special provision is made for corners, window and door framing, plate course, girder course, etc., and the adaptability of the basic block construction for building structure for economical manufacture and building erection is an important feature of my invention.

This is a continuation-in-part of my previous application, Serial No. 190,260, filed October 16, 1950, and now abandoned.

A variety of interlocking blocks have been provided in the past. Each of these various block arrangements have been designed to meet some particular need and to a degree those available have served according to their designed purpose. In many districts suffering from earthquakes and the like, or in districts when firm permanent foundations are difficult to achieve, it has always been difficult to tie together the various elements of block walls so that objectionable cracks will not develop and no one type of block previously developed appears to be able to serve this ever present need.

In my present block it is believed by modifying my standard blocks, which are used most generally throughout the walls, for special construction problems, and adapting the blocks so that they will be tied together throughout the walls, that I have provided a practical solution of this ever present problem. My blocks are particularly adapted to be formed by recently improved processing equipment such as the electronic dryer which minimizes distortion of the parts.

The principal object of this present invention therefore is to provide an integrated set of building blocks which can be built into a wall so interlocked that shifting of the components of the wall can be reduced to an absolute minimum.

A further object of my present invention is to provide an integrated system of building blocks so arranged that a satisfactory finished wall can be laid up even by those unskilled in the handling of masonry walls.

A further object of my present invention is to provide building blocks that will interlock between courses so as to prevent the shifting of one course in respect to the courses either above or below the same and to construct the blocks to take full advantage of the strength of concrete in compression and to minimize subjecting the blocks to tension.

A further object is to provide vertical and horizontal passageways for conduits in the walls and to provide for vertical and horizontal air flow within the walls.

A further object of my present invention is to provide building blocks in which the various courses are interlocked top and bottom so as to prevent the movement of the block along its longitudinal axis as well as to insure the accurate alignment of the faces of the block.

A further object of this invention is to provide special blocks for special construction problems such as forming the corners and forming window and door openings which occur in the wall.

A further object is to provide girders for supporting floors and the like and to provide means for fastening a top plate in place.

A further object is to provide, in a practical construction, maximum height top and bottom key means between vertically abutting blocks so that stresses with vertical or horizontal component forces will be resisted.

Further objects, advantages and capabilities will be apparent from the description and disclosure in the drawings, or may be comprehended or are inherent in the device.

In the drawings:

Figure 1 is a perspective view showing a corner formed by two walls built of my building blocks;

Figure 2 is a perspective view from above of a typical wall block that is most generally used in building walls from my block;

Figure 3 is an enlarged perspective view from below of the block shown in Figure 3;

Figure 4 is a view in the same sense as Figure 2 of a half-block;

Figure 5 is a perspective in the same sense as Figure 3 of a half-block;

Figure 6 is a perspective view of a wall section employing some special purpose blocks;

Figure 7 is an enlarged perspective of a girder block of the type used in Figure 6;

Figure 8 is an enlarged perspective view of a cap block as used in Figure 6;

Figure 9 is a perspective view of a right hand corner block;

Figure 10 is a perspective view of a corner block forming a cap and recessed for a conduit;

Figure 11 is a perspective view showing the way my blocks are used about a window or door opening and showing special blocks for that purpose;

Figure 12 is an enlarged perspective view of a lintel block as used in Figure 11;

Figure 13 is an enlarged perspective view of a jamb forming block as used in Figure 11;

Figure 14 is a sectional view taken on line 14—14 of Figure 12; and

Figure 15 is a sectional view taken on line 15—15 of Figure 12.

Referring more particularly to the disclosure in the drawings, the numeral 10 designates my principal stretcher wall building block. Block 10 has sides 12, and end walls 14, top portion 16, and bottom 18 in a generally rectangular shape with the length about twice the width for ease in forming and assembly. Sides 12 of my block are flush and have a relatively small bevel at 17 around their edges leading to the adjoining surfaces. Block 10 has a raised portion 22 extending longitudinally, between lines spaced from sides and ends of the block, along the top 16 and a recessed portion 24 similarly positioned but slightly larger extending longitudinally between lines spaced from sides and ends along the bottom 18. The raised portion 22 and recessed portion 24 must be centrally positioned along the longitudinal axis of block 10 to insure proper positioning of the blocks during assembly. I have provided for thermal insulation and also conservation of material by providing blocks 10 with single vertical openings 26 extending from top 16 to bottom 18. The use of the single opening has unobvious ad-

vantages in permitting full circulation of air in the walls and in providing passageway for electrical, water and other conduits in the walls.

The coacting raised portion 22 and the recessed portion 24 act to tie vertically adjacent blocks 10 together. As the blocks are usually lapped half way on vertically adjacent courses it is necessary to make special provision to accommodate this lapping. End walls 14 on the usual stretcher block have paired recesses 27 to receive intermediate raised top portions 28 of abutting blocks and the portions 29 between recesses 27 set in inner recesses 30 in top raised portion 22, which are wide enough to accommodate two key portions 29 of horizontally adjacent blocks on the next upper course. Abutments 25 may be provided centrally of primary recesses 24, and will fit between the end walls of the raised portions 22 of superposed lapped blocks. If abutments 25 are omitted, then stretcher blocks 10 can be fully superposed when so desired.

Further tying is provided by second raised portions 32 which appear as U shaped in the full stretcher block and are spaced inwardly from the edges of raised portion 22. The second raised portions 32 set in secondary bottom recesses 34 of like shape but slightly larger. One purpose of having first and second raised and recessed portions 22, 24, 32, 34 is so the first raised portion 22 can be practically coextensive with the length of the block and unbroken, thereby forming a positive weather break, while second raised portion 32 is interrupted for tying purposes.

It is contemplated that a common size for the stretcher block will be for sidewalls 12 to be eight by sixteen inches and end walls 14, eight by eight inches, and that first raised portion 22 will be one inch and secondary raised portion 32 one inch and the bottom recess 34 will be of similar size. This means that for every eight inches upwardly of a wall that there will be two inches of that eight inches in which vertically adjacent blocks will be keyed. One may view this as twenty-five percent interlocking. The raised and recessed portions form, in effect, sockets which not only tie the blocks together against horizontal movement away from each other but also have strength component in other directions because of resistance to rocking movements, as it will be seen they will resist tipping movement of adjacent blocks incident to forces having vertical and horizontal components. In this way the tying structure has maximum effectiveness consonant with reasonable use of material. It will be seen that the amount of concrete used in my stretcher blocks is quite comparable to that used in the conventional cement blocks.

Since walls constructed of my building blocks must terminate in a vertically straight line on occasion, as adjacent doors and windows, and yet must have adjacent courses half off-set, I have provided a half block 40 shown in Figures 4 and 5. Block 40 is just one half the length of stretcher block 10 and has a single opening 39, first and second raised portions, 41, 42, first and second bottom recesses 43, 44 and end grooves 46 which are identically positioned with the similar parts of the full length block 10.

For the juncture of two walls at right angles as illustrated in Figure 1, I have provided corner blocks 50 and 52. These blocks are of identical design; but, while block 50 allows for juncture with a wall lying at a 90 degree angle to the right side, block 52 joins with a similar wall 90 degrees to the left side. These corner blocks 50 and 52 are designed not only to interlock with each other in a staggered arrangement but must also interlock with adjacent stretcher blocks 10 which provide a corner of outstanding strength and rigidity.

For interlocking assembly with straight wall blocks 10, substantially one half of each corner block, as 50, is identical to straight wall blocks 10. The other end of the corner block, as 54, which provides for the right angle juncture, has the same elements as the straight wall block but in a slightly different arrangement. The bottom grooves 55 are provided at one side of the block 50 instead of the end wall, which is solid, to mate with raised portion 56 of the next lower corner block. Tongue key portion 57 between grooves 55 fit in top recesses 58 in the manner of the corresponding portion 29 in stretcher blocks 10. Bevels 59 must also be arranged differently to appear on the outside of the wall.

Special blocks are formed as illustrated in Figures 1 and 10 to accommodate horizontal conduits in the walls, as 60, which it may be desirable to provide for electrical conduits, water lines, heating lines for steam and hot water heating, etc. These conduits are accommodated by providing an inverted U shaped opening 62, in each end wall of the blocks, which is downwardly open and meets steps 64, 66 which will accommodate the raised top portions of the next lower blocks. The running of conduits longitudinally of the blocks is facilitated, it will be observed, from the use of the single elongated central opening in the blocks because otherwise it would be necessary to pass through one or more partitions. Blocks 68 and 70 are blocks of the general type shown in Figure 2, except that they are provided with additional recesses 62, 64 and 66 so as to accommodate pipes 60. They follow in part the showing of Figure 10. Block 72 shown in Figure 10 illustrates the opening for the conduit at a corner and at the uppermost course of a wall in a solid top cap block. Other details of the cap and of corner construction are reviewed elsewhere, but this drawing illustrates the adaptability of my blocks under these circumstances.

One unobvious feature of these blocks is that by the use of the single opening, the staggered courses and the type of top and bottom locking means disclosed, air is free to travel throughout the wall in directions having both horizontal and vertical components. One aspect of any wall is moisture collection, air circulation and dead air insulation, which it will be understood are interrelated, and the provision of this air circulation is important to avoid wetness and other undesirable conditions. Figure 6 shows an illustration of cap blocks 75 and girder blocks 76 for support of floor and the like. It will be understood that the cap and girder blocks would usually be separated a greater distance.

The cap blocks except at corners and the like are identical to the stretcher blocks in their lower portion and have a solid planar top 80. It may be desirable to have openings 82 vertically through top wall 80 for the accommodation of vertical electrical conduits, water pipes and the like. It will be observed that by using one elongated opening in the ordinary stretcher block, as 26, and the alignment of openings vertically through the wall, conduits passing downwardly as through openings 82 may extend vertically to any level. A second purpose of opening 82 is to provide means for bolts to hold plates, joists, rafters, and the like in place. Figure 6 shows a wood plate 84 and a ceiling joist 86 which are tied to the cap course by an angle bracket 88 with bolts 87, 89 secured to the joists and plate respectively. Bolt 89 will have its head inside of cap block 75 and extend through plate 84 and bracket 88 to very securely hold the members in place. The vertically aligned block passageway and the aligned opening in cap block and plate also means that a vertical tie rod can be secured to the foundation and be secured to the plate to hold the roof in place in cyclone conditions and the like.

Girder blocks 76 are formed identically to stretcher block 10 except having at one side an overhung horizontal ledge portion 90 with the side wall 92 under-cutting the ledge to a lower edge 93 which has the same location as in the common stretcher block. Girder blocks of this type may be used to support joists or other purposes as construction indicates the need of a support. In supporting joists, the girder blocks will usually appear

at the ends of the joists in two opposite walls of the building and not in the walls the joists parallel. By the type of construction used, with the flat undercut surface **90**, loads are carried principally by compressive stresses on the blocks which they can best withstand.

Figure 11 is a view of the outside of a window together with the blocks especially adapted for this use, as further shown in Figures 12 and 13. A lintel block **95** is provided which has suitable length, and it has been found that the length shown, of two and one-half stretcher blocks, will accommodate most openings. In the most practical construction, the sash **96** is adapted in size to the opening in terms of full or half block lengths and heights, although it will be apparent to those skilled in the art how blocks can be broken or special blocks made to frame openings for odd sized sash and doors.

Lintel block **95** has a common primary raised portion **98** and a series of secondary raised portions **100** and these follow substantially the construction of stretcher blocks.

Figures 14 and 15 show cross-sections of lintel block **95** in Figure 12 as they appear with the forms used in pouring the concrete filler **97**. A board **99** provides a base on which is mounted stepped platen members **101, 103** appropriately formed to make a recess to mate with the raised top portions of blocks **110** on which the ends of lintel block **95** rest. The intermediate portion of base **99** supports a strip **105** which makes a bottom recess to receive sash **96**. Filler **97** can be poured in the factory or on the job and if desired platen members as **101, 103** can be used in the intermediate portion of base **99** to provide recesses in the lintel block to mate with a series of stretcher blocks, and then block **95** can be used at other places in the wall than at the lintel to strengthen the structure.

The blocks below the sash are preferably cap blocks and numerals **102** and **104** refer to full and half cap blocks. A sill **106** is seated on these blocks.

Full and half jamb blocks **110, 112** are provided at the sides of the sash or door and have vertical central end grooves **114** to accept either the sash directly or a framing member therefor, as illustrated in Figure 11. In other respects, full and half jamb blocks **110, 112** follow the construction of the stretcher blocks. It will be observed that this is a convenient way of framing about windows and doors and saves time and expense over other methods of accomplishing the framing.

Method of operation

My building blocks lend themselves to wall construction by unskilled labor due to the fact that they will lay up in face alignment due to the ribs and grooves provided on the upper and lower faces of the blocks. The blocks may be laid up without sealing on the abutting surfaces due to the accurate forming of the blocks and slight draft or tapering of the ribs and grooves. Usually the surface treatment will provide adequate sealing of the joints. However, the mason may prefer a mortar or mastic sealer on the joints and the blocks are formed with tolerances compensating for this use.

In using my building block to form a wall structure, it is best to start at a corner as shown in Figure 1. The foundation having been properly prepared, corner block **50** is set in place. A straight wall block **10** with cement, generally mortar or mastic, on the end to be abutted, is set in place on the foundation extending at right angles to the corner block. This block is then pressed firmly against the corner block **50** until the excess cement is ejected from the joint and the blocks are close enough together. A second straight block **10** is then set in place and pressed against the first block **10**. This operation is repeated until several blocks have been cemented along the base row.

When the second row is to be started, cement is applied to the top surfaces of the corner block **50** and the straight block **10** which extends at right angles thereto. When this has been done corner block **52** is set in place at right angles to block **50** and pressed firmly down until it is well seated on block **50** and the block **10** which joins block **50** at right angles. With the second, and all subsequent tiers of my blocks, cement, if used, is applied to the abutting ends and to the top surface before the next block is laid thereon. If a concrete foundation is used, or where a positive seal is desired, mortar or mastic is applied to the top of the foundation before the first row is put down.

The blocks are laid in this manner until the builder reaches a location where a window or a doorway is desired. At this time he must use each second tier of blocks a half block which may be the jamb half block **112**. This gives the vertical straight line required. If the conventional prefabricated wooden door or window framing is used, it is now set in and a portion engaged in groove **114** and the tiers are started on the other side with the blocks **110** and blocks **112** abutting the wooden frame. The wooden frame will also accept and distribute the weight of the overhead blocks, insofar as they are not self supporting, so that the tiers may be carried straight across when the top of the frame is reached whether a lintel block **95** is used or not.

If metal window sash is used, the same method is used for laying the blocks but the sash is inserted into groove **114** of blocks **110** and **112** with any appropriate cement serving as an air seal, as illustrated in Figure 11. If the metal sash is to take the weight of overhead blocks, a metal bar lintel is set in the bottom recess of lintel block **95**.

If a smooth or special finish is desired on the wall built of my blocks, as for the inside walls of a house, this finish is applied after the walls are completed. It is for this purpose that I have provided the beveled edge **17** around all the exposed surfaces of my blocks. The desired finish is applied in the conventional manner and flows into the V shaped slot left by the opposing beveled edges. By flowing into these slots, positive adherence is insured and the finish will become and remain a solid part of the wall.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of interlocking building blocks.

Having thus disclosed my invention, I claim:

A dense building block of aggregate and cementitious binder having spaced parallel upright elongated side walls and spaced parallel upright end walls at right angles to the end walls, said building block designed to overlie and cofit with approximately one-half each of two end abutting building blocks, a first continuous flange on top of said side walls and said end walls, said first continuous flange being inset from the upper edge of the side walls and the end walls, said first continuous flange having a first recess at approximately the center of each side portion and in the interior surface of said side portion, said first recesses in the side portions facing each other, two discontinuous flanges on top of the first continuous flange and inset from said first continuous flange, each of the discontinuous flanges extending from near one of the recesses in one side portion of the continuous flange around the end portion of the continuous flange and to near the other recess in the other side portion of the continuous flange, the discontinuity between the two discontinuous flanges in conjunction with said side portions defining a second recess, each end wall on its lower edge having two spaced-apart recesses, that part of the end wall between the two spaced-apart recesses being a key portion, said two spaced-apart recesses and said key portion cofitting with the first continuous flange and the first recess in said first continuous flange of the next lower block so as to lock together the blocks, a first abutment at approximately the center of the lower edge of the side

wall and on the inner face of said side wall, said first abutment designed to cofit between the adjacent end portions of the first continuous flanges of two adjacent next lower blocks, said first abutment dividing the lower interior of the block into two separate first bottom recesses, each first bottom recess extending from one first abutment along the side wall and then the end wall and along the other side wall to the other first abutment, a second abutment at approximately the side wall on the inner face of said side wall, said second abutment being above the first abutment, said second abutment designed to cofit between the adjacent ends of the discontinuous flanges of the two adjacent next lower blocks, said second abutment dividing the interior of the block into two separate second bottom recesses, and each second bottom recess extending from one second abutment along the side wall and then the end wall along the other side wall to the other second abutment.

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